1
2   LISTING OF THE CLAIMS
3

4

5   What is claimed, is:

6

7   1. (currently amended) A method of monitoring events in a computer network, the method

8   comprising:

9

10   said computer network triggering said events, each event being provided with attribute values

11   allocated to a given set of attributes of said each event,

12

13   simultaneously monitoring various event attributes from said given set of attributes versus the

14   arrival time of said each event -the events,

15

16   providing an event display with a cross plot having x and y coordinate axes, the x-axis

17   presenting a time period and the y-axis presenting an attribute value range, and visualizing data

18   along said x and y coordinate axes, said axes being attribute axes,

19

20   determining a primary attribute of said each event the events selected from the given set of

21   attributes to be presented with its attribute values on the y-axis of the cross plot,

22

23   allocating a first display label to the events indicating the attribute values of the primary

24   attribute, providing a pattern algorithm to detect whether an arrived event is part of the given

25   pattern on the basis of a comparison of the attributes allocated to the given pattern and of the

26   attributes assigned to the arrived event, providing a mapping algorithm to map any attribute

27   value of an attribute selected from the given set of attributes onto the y-axis of the cross plot,

28

29   allocating a second display label to said each event the events indicating the attribute values of

30   the attributes being uncovered as part of the given pattern,

31

1   plotting all the events that arrived within the time period and including an attribute value

2   allocated to the primary attribute into the cross plot with the first display label indicating the

3   primary attribute, the position of the first display label of said each event in the cross plot being

4   determined on the basis of the attribute value of the primary attribute of the event and its arrival

5   time,

6

7   plotting the all events that arrived within the time period and being detected by means of the

8   pattern algorithm as part of the given pattern into the cross plot with the second display label

9   indicating the given pattern, the position of the second display label of said each event in the

10   cross plot being determined by the mapping algorithm on the basis of the attribute value of the

11   attribute of the event being uncovered as part of the given pattern and its arrival time, and

12

13   viewing a secondary attribute of said each event together with the primary attribute on said

14   display; and

15

16   automatically generating a large variety of visualizations along other attribute axes, and

17   identifying correlations by superimposing and cross-referencing these visualizations.

18

19   2. (original) The method according to claim 1, further comprising:

20

21   recording the attribute values and the arrival time of a new event, determining on the basis of the

22   recorded attribute values of event whether or not the newly arrived event includes an attribute

23   value of the primary attribute, and if the newly arrived event includes the attribute value for the

24   primary attribute shifting the x-axis of the cross plot so that the time period being presented on

25   the x-axis covers the arrival time of the event, and

26

27   plotting the event arrived within the shifted time period into the cross plot with the first display

28   label indicating the primary attribute.

29

30   3. (original) The method according to claim 2 comprising the further steps of:

31

1   determining on the basis of the recorded attribute values of event whether or not the newly

2   arrived event is part of the given pattern on the basis of a comparison of the attributes allocated

3   to the given pattern and of the attributes assigned to the arrived event,

4

5   if the newly arrived event includes an attribute value of the given pattern adding the event to the

6   previous events being detected as part of the given pattern, and

7

8   redrawing all the events being associated with given pattern in the cross plot.

9

10   4. (currently amended) The method according to claim 3, further comprising:

11

12   if the newly arrived event does not include an attribute value of the given pattern, determining on

13   the basis of the recorded attribute values of all previous arrived events by means of the pattern

14   algorithm whether or not the newly arrived event is part of a new pattern on the basis of a

15   comparison of the attributes allocated to the new pattern and of the attributes assigned to the

16   arrived events;

17

18   if the newly arrived event forms together with previous recorded events the new pattern,

19   allocating a third display label to the events indicating the attribute values of the attributes being

20   uncovered as part of the new pattern; and

21

22   plotting the all events being detected by means of the pattern algorithm as part of the new pattern

23   into the cross plot with the third display label indicating the new pattern, the position of the third

24   display label of <u>said</u> each event in the cross plot being determined by the mapping algorithm on

25   the basis of the attribute value of the attribute of the event being uncovered as part of the new

26   pattern and its arrival time.

27

28   5. (currently amended) The method according to claim 1 , further comprising:

29

30   removing all the events including an attribute value allocated to the primary attribute from the

31   cross plot, if a primary attribute to be presented with its attribute values on the y-axis of the cross

1 plot is changed, allocating a fourth display label to the events indicating the attribute values of

2 the new primary attribute, and

3

4 plotting all the events arrived within the time period and including an attribute value allocated to

5 the new primary attribute into the cross plot with the fourth display label indicating the new

6 primary attribute, the position of the fourth display label of said each event in the cross plot

7 being determined on the basis of the attribute value of the primary attribute of the event and its

8 arrival time.

9

10 6. (original) The method according to claim 1 comprising the further steps of plotting all

11 attribute values recorded for an event with the respective display label into the cross plot if the

12 event is selected by an operator, and displaying textual information associated with the selected

13 event on the event display.

14

15 7. (original) The method according to claim 1, wherein the pattern algorithm is suitable to

16   perform multi-attribute pattern recognition.

17

18 8. (original) The method according to claim 1, wherein each display label includes a specific

19   color and/or a specific mark layout.

20

21 9. (original) The method according to claim 1, wherein all events being uncovered as part of the

22   pattern are clustered by the corresponding display label.

23

24 10. (currently amended) A method according to claim 1, further comprising employing a

25   computer readable program on tangible computer media containing comprising a

26   program code to cause the carrying carry out the steps of triggering, monitoring,

27   providing, determining, allocating a first display label, allocating a second display label,

28   plotting events including an attribute value, plotting events detected, viewing, and

29   automatically generating, the method of claim 1, when the program code is running on a

30   computer.

31

1   11. (currently amended) A computer program *on a computer readable medium* containing a

2   program code to carry out ~~the~~ all steps of the method of claim 1, said program code being

3   stored on data carrier.

4

5   12. (original) An event visualization device for monitoring events in a computer network, the

6   device comprising means to perform ~~the~~ all steps of the method as claimed in claim 1.

7

8   13. (currently amended) An article of manufacture comprising a computer ~~usable~~ readable

9   medium having computer readable program code means embodied therein for causing

10 monitoring of events in a computer network, the computer readable program code means in said

11 article of manufacture comprising computer readable program code means for causing a

12 computer to effect ~~the~~ all steps of claim 1.

13

14 14. (currently amended) A program storage device being *a computer* readable medium ~~by~~

15 ~~machine~~, tangibly embodying a program of instructions executable by the machine to perform

16 method steps for monitoring events in a computer network, said method steps comprising the

17 steps of said computer network triggering said events, each event being provided with attribute

18 values allocated to a given set of attributes of said each event,

19 simultaneously monitoring various event attributes from said given set of attributes versus the

20 arrival time of said each event ~~the events~~,

21

22 providing an event display with a cross plot having x and y coordinate axes, the x-axis

23 presenting a time period and the y-axis presenting an attribute value range, and visualizing data

24 along said x and y coordinate axes, said axes being attribute axes,

25

26 determining a primary attribute of said each event ~~the events~~ selected from the given set of

27 attributes to be presented with its attribute values on the y-axis of the cross plot,

28

29 allocating a first display label to the events indicating the attribute values of the primary

30 attribute, providing a pattern algorithm to detect whether an arrived event is part of the given

31 pattern on the basis of a comparison of the attributes allocated to the given pattern and of the

1   attributes assigned to the arrived event, providing a mapping algorithm to map any attribute

2   value of an attribute selected from the given set of attributes onto the y-axis of the cross plot,

3

4   allocating a second display label to said each event the events indicating the attribute values of

5   the attributes being uncovered as part of the given pattern,

6

7   plotting all the events that arrived within the time period and including an attribute value

8   allocated to the primary attribute into the cross plot with the first display label indicating the

9   primary attribute, the position of the first display label of said each event in the cross plot being

10   determined on the basis of the attribute value of the primary attribute of the event and its arrival

11   time,

12

13   plotting the all events that arrived within the time period and being detected by means of the

14   pattern algorithm as part of the given pattern into the cross plot with the second display label

15   indicating the given pattern, the position of the second display label of said each event in the

16   cross plot being determined by the mapping algorithm on the basis of the attribute value of the

17   attribute of the event being uncovered as part of the given pattern and its arrival time, and

18

19   viewing a secondary attribute of said each event together with the primary attribute on said

20   display; and

21

22   automatically generating a large variety of visualizations along other attribute axes, and

23   identifying correlations by superimposing and cross-referencing these visualizations.

24

25   15. (currently amended) A computer program product comprising a computer usable readable

26   medium having computer readable program code means embodied therein for causing the event

27   visualization device, the computer readable program code means in said computer program

28   product comprising computer readable program code means for causing a computer to effect the

29   all functions of claim 12.

30

31   16. (previously presented) The method according to claim 1, further comprising:

1

2 recording the attribute values and the arrival time of a new event, determining on the basis of the

3 recorded attribute values of event whether or not the newly arrived event includes an attribute

4 value of the primary attribute, and if the newly arrived event includes the attribute value for the

5 primary attribute shifting the x-axis of the cross plot so that the time period being presented on

6 the x-axis covers the arrival time of the event,

7

8 plotting the event arrived within the shifted time period into the cross plot with the first display

9 label indicating the primary attribute;

10

11 determining on the basis of the recorded attribute values of event whether or not the newly

12 arrived event is part of the given pattern on the basis of a comparison of the attributes allocated

13 to the given pattern and of the attributes assigned to the arrived event;

14

15 if the newly arrived event includes an attribute value of the given pattern adding the event to the

16 previous events being detected as part of the given pattern;

17

18 redrawing all the events being associated with given pattern in the cross plot;

19

20 if the newly arrived event does not include an attribute value of the given pattern, determining on

21 the basis of the recorded attribute values of all previous arrived events by means of the pattern

22 algorithm whether or not the newly arrived event is part of a new pattern on the basis of a

23 comparison of the attributes allocated to the new pattern and of the attributes assigned to the

24 arrived events;

25

26 if the newly arrived event forms together with previous recorded events the new pattern,

27 allocating a third display label to the events indicating the attribute values of the attributes being

28 uncovered as part of the new pattern; and

29

30 plotting the all events being detected by means of the pattern algorithm as part of the new pattern

31 into the cross plot with the third display label indicating the new pattern, the position of the third

1   display label of each event in the cross plot being determined by the mapping algorithm on the

2   basis of the attribute value of the attribute of the event being uncovered as part of the new pattern

3   and its arrival time;

4

5   17. (previously presented) The method according to claim 16, further comprising:

6

7   removing all the events including an attribute value allocated to the primary attribute from the

8   cross plot, if a primary attribute to be presented with its attribute values on the y-axis of the cross

9   plot is changed, allocating a fourth display label to the events indicating the attribute values of

10 the new primary attribute, and

11

12 plotting all the events arrived within the time period and including an attribute value allocated to

13 the new primary attribute into the cross plot with the fourth display label indicating the new

14 primary attribute, the position of the fourth display label of each event in the cross plot being

15 determined on the basis of the attribute value of the primary attribute of the event and its arrival

16 time.

17

18 18. (previously presented) The event visualization device for monitoring events in a computer

19 network, according to claim 12, further comprising:

20

21 means for recording the attribute values and the arrival time of a new event, means for

22 determining on the basis of the recorded attribute values of event whether or not the newly

23 arrived event includes an attribute value of the primary attribute, and if the newly arrived event

24 includes the attribute value for the primary attribute shifting the x-axis of the cross plot so that

25 the time period being presented on the x-axis covers the arrival time of the event,

26

27 means for plotting the event arrived within the shifted time period into the cross plot with the

28 first display label indicating the primary attribute;

29

1 means for determining on the basis of the recorded attribute values of event whether or not the

2 newly arrived event is part of the given pattern on the basis of a comparison of the attributes

3 allocated to the given pattern and of the attributes assigned to the arrived event;

4

5 means for adding for if the newly arrived event includes an attribute value of the given pattern

6 adding the event to the previous events being detected as part of the given pattern;

7

8 means for redrawing all the events being associated with given pattern in the cross plot;

9

10 means for determining if the newly arrived event does not include an attribute value of the given

11 pattern, means for determining on the basis of the recorded attribute values of all previous

12 arrived events by means of the pattern algorithm whether or not the newly arrived event is part

13 of a new pattern on the basis of a comparison of the attributes allocated to the new pattern and of

14 the attributes assigned to the arrived events;

15

16 means for allocating if the newly arrived event forms together with previous recorded events the

17 new pattern, allocating a third display label to the events indicating the attribute values of the

18 attributes being uncovered as part of the new pattern; and

19

20 means for plotting the all events being detected by means of the pattern algorithm as part of the

21 new pattern into the cross plot with the third display label indicating the new pattern, the position

22 of the third display label of each event in the cross plot being determined by the mapping

23 algorithm on the basis of the attribute value of the attribute of the event being uncovered as part

24 of the new pattern and its arrival time;

25

26 19. (previously presented) The event visualization device for monitoring events in a computer

27 network, according to claim 18, further comprising:

28

29 means for removing all the events including an attribute value allocated to the primary attribute

30 from the cross plot, if a primary attribute to be presented with its attribute values on the y-axis of

1   the cross plot is changed, allocating a fourth display label to the events indicating the attribute

2   values of the new primary attribute, and

3

4   means for plotting all the events arrived within the time period and including an attribute value

5   allocated to the new primary attribute into the cross plot with the fourth display label indicating

6   the new primary attribute, the position of the fourth display label of each event in the cross plot

7   being determined on the basis of the attribute value of the primary attribute of the event and its

8   arrival time.

9

10   20. (currently amended) An article of manufacture comprising apparatus for monitoring events in

11   a computer network, the ~~method~~ apparatus comprising:

12

13   said computer network having means for triggering said events, each event being provided with

14   attribute values allocated to a given set of attributes of said each event,

15

16   means for simultaneously monitoring various event attributes from said given set of attributes

17   versus the arrival time of said each event ~~the events~~,

18

19   means for providing an event display with a cross plot having x and y coordinate axes, the x-axis

20   presenting a time period and the y-axis presenting an attribute value range, and visualizing data

21   along said x and y coordinate axes, said axes being attribute axes,

22

23   means for determining a primary attribute of said each event ~~the events~~ selected from the given

24   set of attributes to be presented with its attribute values on the y-axis of the cross plot,

25

26   means for allocating a first display label to the events indicating the attribute values of the

27   primary attribute, providing a pattern algorithm to detect whether an arrived event is part of the

28   given pattern on the basis of a comparison of the attributes allocated to the given pattern and of

29   the attributes assigned to the arrived event, providing a mapping algorithm to map any attribute

30   value of an attribute selected from the given set of attributes onto the y-axis of the cross plot,

31

1   means for allocating a second display label to said each event the events indicating the attribute

2   values of the attributes being uncovered as part of the given pattern,

3

4   means for plotting all the events that arrived within the time period and including an attribute

5   value allocated to the primary attribute into the cross plot with the first display label indicating

6   the primary attribute, the position of the first display label of said each event in the cross plot

7   being determined on the basis of the attribute value of the primary attribute of the event and its

8   arrival time,

9

10   means for plotting the all events that arrived within the time period and being detected by means

11   of the pattern algorithm as part of the given pattern into the cross plot with the second display

12   label indicating the given pattern, the position of the second display label of said each event in

13   the cross plot being determined by the mapping algorithm on the basis of the attribute value of

14   the attribute of the event being uncovered as part of the given pattern and its arrival time, and

15

16   means for viewing a secondary attribute of said each event together with the primary attribute on

17   said display; and

18

19   means for automatically generating a large variety of visualizations along other attribute axes,

20   and identifying correlations by superimposing and cross-referencing these visualizations.

21